

South Dakota State University

Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

SDSU Extension Fact Sheets

SDSU Extension

1959

Electric Motor Selection

Cooperative Extension

South Dakota State University

Follow this and additional works at: https://openprairie.sdstate.edu/extension_fact

Recommended Citation

Extension, Cooperative, "Electric Motor Selection" (1959). *SDSU Extension Fact Sheets*. 177.
https://openprairie.sdstate.edu/extension_fact/177

This Fact Sheet is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Fact Sheets by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

Historical, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



For current policies and practices, contact SDSU Extension

Website: extension.sdstate.edu

Phone: 605-688-4792

Email: sdsu.extension@sdstate.edu

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

ELECTRIC MOTOR SELECTION

By Wm. H. Peterson, Extension Rural Electric Specialist

MOTOR TYPE IS IMPORTANT

In order to run and pull a load, a motor must first be able to start the load. Motors vary a great deal in their ability to start loads, as well as in the amount of current (amps) they use in starting. Too-high starting current will affect operation of other equipment.

Split-Phase motor. This is usually the cheapest type available, and is suited only to easy-starting jobs, such as fans and blowers. This type usually draws a heavy starting current.

Capacitor-Start motor. This motor is a good selection for all-around use, as it has a starting pull several times as much as the split-phase motor. Starting current is about the same.

Repulsion-Start motor. This type will start the heaviest load of the three types, with the least starting current. It is well suited to loads that are hard to "break loose" such as chain elevators, and conveyers.

Capacitor-start-and-run. Usually available only in sizes greater than two horsepower; is suited to continuous operating loads, such as crop drying fans. It draws less running current and has good pull in bringing a flywheel-type load up to speed. It will start moderately heavy loads.

Other motor types. Other types of motors are in use on farms—such as the series-type (often called "universal" because it runs on AC or DC current) used in electric drills and vacuum cleaners; the shaded-pole motor which is used in small fans and blowers. These are usually built into the equipment by the manufacturer.

MOTOR ENCLOSURE MUST FIT THE CONDITION

Open type enclosures are lowest in cost. Air circulates freely through the rotor and windings of the motor. It should be used only in dry, dust-free locations.

Drip-proof enclosures prevent falling water drops from entering, but because air circulates through them, dust or snow

Select the right motor for the job you expect it to do, and you'll have fewer motor failures.

Electric Motor Selection



will enter. They are suitable for places where subject to occasional moisture, such as a milkhouse.

Totally enclosed motors are advised for dusty, or wet locations. In a totally enclosed motor no air is circulated through the motor from outside. However, there is a fan inside the motor which circulates the air. Some totally enclosed motors have a fan on the outside which circulates outside air over the shell.

MOTOR BEARINGS MUST FIT TYPE OF DUTY.

Sleeve-bearings are the most common type. They are suited to most jobs if lubricated at regular intervals, and motor is operated in horizontal (normal) position. Some sleeve-bearing motors have oil reservoirs which are filled regularly; others have a saturated wick. Many sleeve-bearing motors should not be operated on end, as oil will run out.

Ball-bearings are advised if the motor must operate on end. Often the ball bearings are "lifetime lubricated"; some may require lubrication every few years. Ball bearing motors can be operated in any position, and can take end thrust on the shaft.

OVERLOAD PROTECTION USUALLY NEEDED

Since most electric motors will actually pull two or more times the nameplate horsepower without slowing down enough to

Split phase



Capacitor start



Repulsion start



Capacitor start and run



notice, some type of over-load protection is necessary on any motor that is not being watched while it runs.

Fractional horsepower motors for portable equipment can be purchased with a built-in overload protection. This may be automatic-reset or manual-reset (a red button on one end of the motor). The manual-reset type will prevent possible re-starting of machinery while someone is in position to be injured. Rating of installed protection should be not over 1 1/4 times the motor nameplate amps.

PROPER GROUNDING IS IMPORTANT

Since most farm motors operate in locations where it would be dangerous for persons or animals to receive a shock, grounding of motor frames is advised. This requires a third wire from the motor frame to the grounded part of the service entrance fusebox. Connection to a driven ground rod or to a water pipe is not advised, as this method is too often not good enough. Check with your power supplier wiring inspector on grounding methods.

MOTOR SPEED SHOULD BE CHECKED

Most motors for farm use turn at 1725 r.p.m. (revolutions per minute). Motors of 3450 r.p.m. are available at a slightly lower cost, but will require more gearing-down to most machines. Motors of 1140 r.p.m. are available at higher cost for



Totally enclosed motor, left, open motor, right.

slower-turning machines. Speed of the driven machine will be in proportion to the pulley sizes. For instance, with a four-inch pulley on the motor and a six-inch pulley on the machine, the machine speed will be 4/6 (or 2/3) of the motor speed.

SELECT REQUIRED HORSEPOWER

Equipment manufacturers specify motor horsepower required. Usually a gasoline engine can be replaced by an electric motor of about 2/3 the horsepower rating. Often a motor can be made to carry a load that is too large by changing pulleys to run the machine slower, provided machine speed is not important.

ELECTRIC MOTOR SELECTION SUMMARY

Motor Type	Starting Pull	Starting Current	Common Sizes	Identifying Features	Reversing Method	Suitable Loads
Split-Phase Start	2 Times rated load	6 to 8 times rated amps	up to 1 hp.	Starting switch, no capacitor or brushes	electric*	Washing machines, Shop tools, fanning mills, blowers
Capacitor-Start	4 times rated load	5 to 6 times rated amps	up to 2 hp.	Starting switch & capacitor	electric*	Concrete mixers, auger elevators, air compressors, water pumps
Repulsion-Start	6 times rated load	3 to 4 times rated amps	up to 20 hp.	Brushes, connected to each other	shift brushes	Grinders, deep-well pumps, silo unloaders, bunk-feeders, conveyers, elevators, air compressors
Capacitor-Start-and-Run	4 times rated load	5 to 6 times rated amps	up to 20 hp.	Two Capacitors	electric*	Crop drying fans, conveyors, elevators, bunk feeders, hammermills, mixers
Series (Universal)	8 to 10 times rated load	8 to 10 times rated amps	up to 1 hp.	Brushes and High Speed (over 3600 rpm)	not usually reversible	Drills, vacuum cleaners, power saws, sanders
Shaded-Pole	less than rated load	1 1/2 times rated amps	up to 1/6 hp.	No brushes, no starting switch (no radio interference)	not usually reversible	Small blowers & fans, some sanders

*reversing electrically is done by changing wires at the motor terminals